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IS 10124-1 (2009): Fabricated PVC-U Fittings for Potable Water Supplies - Specification, Part 1: General Requirements [CED 50: Plastic Piping System]



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पेय जल आपूर्ति के लिए सविरंचित
पी वी सी-यू फिटिंगें — विशिष्टि
भाग 1 सामान्य अपेक्षाएँ
(दूसरा पुनरीक्षण)

Indian Standard
FABRICATED PVC-U FITTINGS FOR POTABLE WATER
SUPPLIES — SPECIFICATION
PART 1 GENERAL REQUIREMENTS
(*Second Revision*)

ICS 23.040.45; 91.140.60

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Price Group 3

FOREWORD

This Indian Standard (Part 1) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastics Piping Systems Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was first published in 1982 and revised in 1988. In this revision, following modifications have been made:

- a) Sizes and classes of fittings have been aligned with IS 4985 : 2000 'Unplasticized PVC pipes for potable water supplies — Specification'.
- b) Requirements for sockets for elastomeric sealing ring joints have also been included.

The requirements of fabricated PVC-U fittings are covered in thirteen parts. The other parts in the series are:

- Part 2 Specific requirements for sockets
- Part 3 Specific requirements for straight reducers
- Part 4 Specific requirements for caps
- Part 5 Specific requirements for equal tees
- Part 6 Specific requirements for flanged tail pieces with metallic flanges
- Part 7 Specific requirements for threaded adaptors
- Part 8 Specific requirements for 90° bends
- Part 9 Specific requirements for 60° bends
- Part 10 Specific requirements for 45° bends
- Part 11 Specific requirements for 30° bends
- Part 12 Specific requirements for 22 ½° bends
- Part 13 Specific requirements for 11 ¼° bends

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the results of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FABRICATED PVC-U FITTINGS FOR POTABLE WATER SUPPLIES — SPECIFICATION

PART 1 GENERAL REQUIREMENTS

(Second Revision)

1 SCOPE

This standard (Part 1) covers general requirements for materials, sizes, methods of test and inspection and marking of all types of fabricated PVC-U fittings for jointing with solvent cement and elastomeric sealing ring joints to the PVC pipes covered in IS 4985, for potable water supplies.

This specification covers the sizes of fittings from 20 to 630 mm.

2 REFERENCES

The standards listed below contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

| <i>IS No.</i> | <i>Title</i> |
|-----------------------|-------------------------------------------------------------------------------------------------------|
| 4905 : 1968 | Methods of random sampling |
| 4985 : 2000 | Unplasticized PVC pipes for potable water supplies — Specification (<i>third revision</i>) |
| 12235 (Part 3) : 2004 | Thermoplastics pipes and fittings — Methods of test: Part 3 Test of opacity (<i>first revision</i>) |

3 MATERIAL

The pipes used for the fabrication of PVC-U fittings for potable water supplies shall conform to IS 4985.

4 SIZE OF FITTING

The sizes of fittings shall be designated by the nominal diameters of the pipe given in IS 4985 with which they are to be used.

5 SOCKET LENGTHS AND DIAMETER AT MID-POINT OF SOCKET LENGTH

5.1 The minimum socket length of any fitting

(see Fig. 1) shall be given by expression:

$$L = 0.5 D + 6 \text{ mm}$$

where

L = socket length, and

D = nominal inside diameter of fitting (corresponding to the outside diameter of the pipe covered in IS 4985).

5.1.1 The socket length is applicable to socket fittings for pipes of any diameter under pressure. The minimum socket lengths based on the formula in 5.1 for socket diameters are given in Table 1.

5.1.2 The maximum and minimum dimensions of mean inside diameter at mid-point of socket depth shall comply with those given in Table 1.

NOTES

1 The mean inside diameter of the socketed portion of the fittings is defined as being the arithmetical mean of two diameters measured at 90° to each other at the mid-point of socket length using the same cross-section. The diameter of the socket may be decreased from mouth to root; for pipe size 63 to 75 mm, the total included angle of taper shall not exceed $0^\circ 40'$; and for pipe sizes 90 mm and above, the total included angle of taper shall not exceed $0^\circ 30'$.

2 Only the manufacturer of fabricated PVC-U fittings is equipped to measure the socket inside diameter. Since the socket length is a minimum only (no tolerance is given to this dimension), it is not practical, other than for the manufacturer to establish the exact position of the mid-point of the socket. He can therefore, tool up to measure his own fittings but such equipment will not necessary give the correct figures for a fitting of other manufacturer.

5.1.3 Out of Roundness Tolerance of Socket Inside Diameter

The maximum out-of-roundness tolerances (maximum diameter — minimum diameter) shall be:

- a) Equal to $0.007 D$, or
- b) Equal to 0.2 mm (If $0.007 D$ is less than 0.2 mm).

NOTE — Out-of-roundness tolerance of socket inside diameter shall not apply to fittings of nominal pressure rating 0.25 MPa (Class 1), 0.4 MPa (Class 2) and 0.6 MPa (Class 3).

5.2 Dimensions of socket for elastomeric sealing ring joint shall be as specified in Table 2 read with Fig. 2.

6 TESTS AND PERFORMANCE REQUIREMENTS

6.1 Opacity

When tested in accordance with IS 12235 (Part 3) the wall of the fitting shall not transmit more than 0.2 percent of the visible light falling on it.

6.2 Short Term Hydraulic Test

When tested in accordance with Annex A, the fittings shall withstand the minimum pressure of 4.19 times of working pressure of the fitting for 1 h.

7 SAMPLING

7.1 Type Test

Type tests are intended to prove the suitability and performance of new composition, a new compounding or processing techniques or a new design of size of joint or fitting. Such tests, therefore, need be applied only when a change is made in polymer composition or method of manufacture or when a new size or type of fitting is to be introduced.

7.1.1 Type tests for compliance with **6.1** shall be carried out on three samples taken at random from the smallest size and lowest class of fitting (that is, on fitting having the thinnest wall).

7.1.2 All the fittings tested shall comply with the requirements for which they are examined.

7.2 Production Routine Test

These tests are spot tests carried out during manufacture to prove the quality of a lot of fitting, and shall be carried out by the method specified in **5** and **6.2**.

7.2.1 Lot

In a single consignment, all fittings of the same size, same thickness, same length and fabricated under essentially similar conditions shall be grouped together to constitute a lot.

7.2.2 The conformity of the lot to the requirement of this specification shall be ascertained for each lot separately. The number of socket fittings to be sampled from each lot shall depend on the size of lot and shall be in accordance with col 2 and 3 of Table 3.

7.2.2.1 These fittings shall be selected from the lot at random. In order to ensure the randomness of selection, procedure given in IS 4905 may be followed.

7.2.3 Number of Test and Criteria for Conformity

7.2.3.1 Each socket fitting so selected shall be examined for requirement given in **5.1**, **5.2** and **6.2**. Any socket fitting failing in one or more of these requirements shall be considered as defective. The lot shall be considered as conforming to the requirements of this specification if the number of defective socket fittings found in the sample does not exceed the corresponding acceptance number *A* given in col 4 of Table 3.

7.2.3.2 The lot rejected according to **7.2.3.1** may be retested for characteristics for which it has failed. For this purpose, number of socket fittings to be selected at random from the lot shall be according to col 2 and col 3 of Table 3. A socket fitting failing to satisfy the requirements of these characteristics shall be considered as defective. The lot shall be deemed to satisfy the requirements of this specification if the number of defective socket fittings found in the sample does not exceed the corresponding acceptance number *B* given in col 5 of Table 3, otherwise the lot shall be rejected.

8 MARKING

8.1 All fittings shall be clearly and indelibly marked at a prominent place visible even after installation of the fitting with the following:

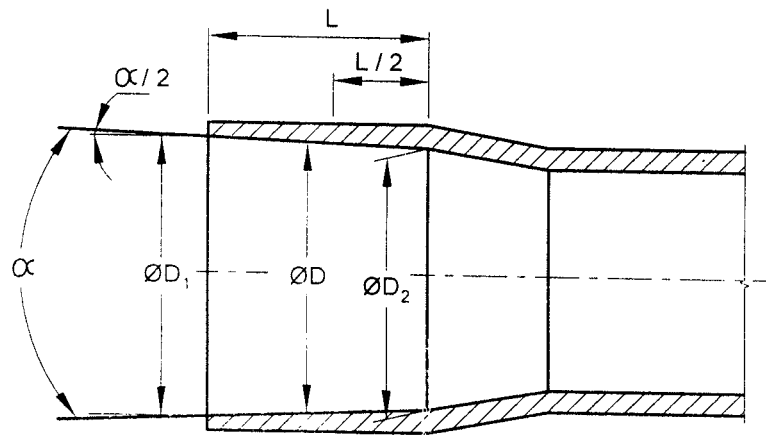
- Manufacturer's name or identification mark;
- Size of fitting (*see 4*) and the appropriate class (working pressure) of IS 4985 to which the pressure rating of the fitting corresponds;
- Degree of bend in case of fabricated bends; and
- Fitting shall be marked in colour as indicated below for different classes fittings:

| <i>Class of the Fittings</i> | <i>Colour</i> |
|------------------------------|---------------|
| Class 1 (0.25 MPa) | Red |
| Class 2 (0.4 MPa) | Blue |
| Class 3 (0.6 MPa) | Green |
| Class 4 (0.8 MPa) | Brown |
| Class 5 (1.0 MPa) | Yellow |
| Class 6 (1.25 MPa) | Black |
| Plumbing | Pink |

8.2 BIS Certification Marking

Each fitting may also be marked with the Standard Mark.

8.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of the Standard Mark may be granted to the manufacturer or producer may be obtained from the Bureau of Indian Standards.



D = diameter at mid-point of socket length,
 D_1 = diameter at mouth,
 D_2 = diameter at root,

L = socket length, and
 α = total included angle of taper.

NOTE — This drawing is only intended to define the terms used in Table 1 and is not intended to illustrate specific design features. It is possible to calculate the diameter D_1 and D_2 knowing D , L and α from the following equation.

$$D_2 = D - L \tan \alpha/2; \text{ and}$$

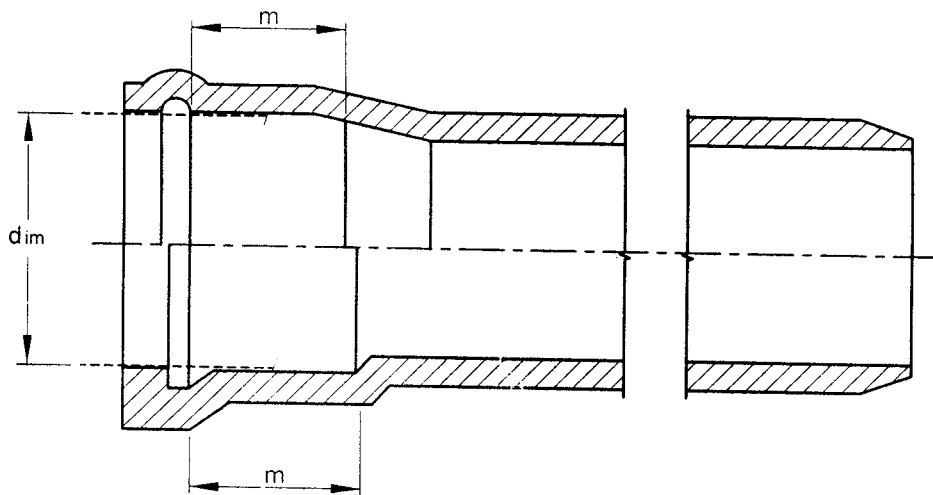
$$D_1 = D + L \tan \alpha/2.$$

FIG. 1 SOCKET DIMENSIONS

Table 1 Socket Dimensions
(Clauses 5.1.1, 5.1.2, and Fig.1)

All dimensions in millimetres.

| Sl No. | Nominal Size | Minimum Socket Length | Mean Socket Internal Diameter at Mid-Point of Socket Length | |
|--------|--------------|-----------------------|-------------------------------------------------------------|-------|
| | | | Min | Max |
| (1) | (2) | (3) | (4) | (5) |
| i) | 20 | 16.0 | 20.1 | 20.3 |
| ii) | 25 | 19.0 | 25.1 | 25.3 |
| iii) | 32 | 22.0 | 32.1 | 32.3 |
| iv) | 40 | 26.0 | 40.1 | 40.3 |
| v) | 50 | 31.0 | 50.1 | 50.3 |
| vi) | 63 | 37.5 | 63.1 | 63.3 |
| vii) | 75 | 43.5 | 75.1 | 75.3 |
| viii) | 90 | 51.0 | 90.1 | 90.3 |
| ix) | 110 | 61.0 | 110.1 | 110.4 |
| x) | 125 | 68.5 | 125.1 | 125.4 |
| xi) | 140 | 76.0 | 140.2 | 140.5 |
| xii) | 160 | 86.0 | 160.2 | 160.5 |
| xiii) | 180 | 96.0 | 180.2 | 180.5 |
| xiv) | 200 | 106.0 | 200.3 | 200.6 |
| xv) | 225 | 118.5 | 225.3 | 225.7 |
| xvi) | 250 | 131.0 | 250.4 | 250.8 |
| xvii) | 280 | 146.0 | 280.4 | 280.9 |
| xviii) | 315 | 163.5 | 315.4 | 316.0 |
| xix) | 355 | 183.5 | 355.4 | 356.0 |
| xx) | 400 | 206.0 | 400.4 | 401.0 |
| xxi) | 450 | 231.0 | 450.4 | 451.0 |
| xxii) | 500 | 256.0 | 500.4 | 501.0 |
| xxiii) | 560 | 286.0 | 560.4 | 561.0 |
| xxiv) | 630 | 321.0 | 630.4 | 631.0 |



d_{im} = mean socket inner diameter at mid point of depth of engagement, and
 m = minimum depth of engagement.

NOTE — This drawing is only intended to define the terms used in Table 2 and is not intended to illustrate specific design features.

FIG. 2 SOCKET FOR ELASTOMERIC SEALING RING JOINT

Table 2 Dimensions of Socket for Elastomeric Sealing Ring Joint

(Clause 5.2, and Fig. 2)

All dimensions in millimetres.

| Sl No. | Nominal Size | Minimum Depth of Engagement (m) | Mean Socket Internal Diameter at Mid-Point of Depth of Engagement (d_{im}) | |
|--------|--------------|-------------------------------------|--------------------------------------------------------------------------------|-------|
| | | | Min | Max |
| (1) | (2) | (3) | (4) | (5) |
| i) | 63 | 64 | 63.6 | 64.3 |
| ii) | 75 | 67 | 75.6 | 76.3 |
| iii) | 90 | 70 | 90.7 | 91.5 |
| iv) | 110 | 75 | 110.8 | 111.7 |
| v) | 125 | 78 | 125.9 | 126.9 |
| vi) | 140 | 81 | 140.9 | 141.9 |
| vii) | 160 | 86 | 161.0 | 162.1 |
| viii) | 180 | 90 | 181.1 | 182.2 |
| ix) | 200 | 94 | 201.2 | 202.3 |
| x) | 225 | 100 | 226.4 | 227.5 |
| xi) | 250 | 105 | 251.5 | 252.6 |
| xii) | 280 | 112 | 281.6 | 283.0 |
| xiii) | 315 | 118 | 316.8 | 318.3 |
| xiv) | 355 | 124 | 357.0 | 358.7 |
| xv) | 400 | 130 | 402.2 | 404.1 |
| xvi) | 450 | 138 | 452.5 | 454.5 |
| xvii) | 500 | 145 | 502.1 | 504.1 |
| xviii) | 560 | 154 | 562.8 | 565.2 |
| xix) | 630 | 165 | 632.3 | 634.9 |

Table 3 Scale of Sampling and Permissible Number of Defectives
(Clause 7.2.2)

| Sl No. | Number of Fitting in the Lot | Sample Size | Acceptance Number <i>A</i> | Acceptance Number <i>B</i> |
|--------|---------------------------------|-------------|----------------------------------|----------------------------------|
| (1) | (2) | (3) | (4) | (5) |
| i) | Up to 150 | 3 | 0 | 0 |
| ii) | 151-300 | 5 | 0 | 0 |
| iii) | 301-500 | 8 | 0 | 0 |
| iv) | 501-1 000 | 13 | 1 | 0 |
| v) | 1 001-3 000 | 20 | 1 | 0 |
| vi) | 3 001-10 000 | 32 | 2 | 1 |
| vii) | 10 001-35 000 | 50 | 3 | 2 |
| viii) | 35 001-150 000 | 80 | 5 | 3 |
| ix) | 150 001 and above | 125 | 7 | 5 |

ANNEX A

(Clause 6.2)

SHORT TERM HYDRAULIC TEST

A-1 APPARATUS

A-1.1 Equipment which permits the application of an internal hydraulic pressure of minimum 4.19 times the working pressure for at least one hour on the fitting to be tested.

A-2 TEST SPECIMEN

A-2.1 Each test specimen shall consists of a fitting solvent welded to a section of pipe having a minimum length of 250 mm and capable of withstanding an internal pressure of at least 4.19 times the working pressure of the fitting. A period of at least 24 h shall be allowed to ensure satisfactory setting of the joint.

A-3 PROCEDURE

A-3.1 The free end of the pipe section shall be connected to the hydraulic pressure equipment. The other ends of the test specimen shall be closed by any appropriate means.

A-3.2 The test specimen thus assembled shall be subjected for 60 minutes to an internal pressure of

specified pressure of the fitting at a temperature of $27 \pm 2^\circ\text{C}$.

A-3.3 Throughout the test, the specimen must be suspended or placed in such a manner that the induced stress in the assembly is not limited by external forces.

A-4 INTERPRETATION OF RESULTS

A-4.1 A fitting shall be considered as having passed the test if it shows no sign of deterioration, leakage, fracture or other failure under specified condition. The test shall be repeated if the pipe bursts or if the solvent-welded joints leak.

A-4.2 The specimen tested as above shall meet the requirements specified in 6.2.

NOTE — The fittings can be tested by the method indicated as above after a period of setting for 24 h and, if it passes the test shall be accepted as meeting the requirements specified in 6.2. In case of failure of the joint retest can be done taking another test specimen and allowing at least 10 days for satisfactory setting of joint and the final decision to be taken based on test result obtained on this test specimen.

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Amendments Issued Since Publication

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